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SOUTHERN FOREST EXPERIMENT STATION, FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE

**BARK BEETLES
RAMPAGE****What to do?**

Damaging and unpredictable, the southern pine beetle has been on the rampage in Louisiana forests this spring. State Forester James E. Mixon calls the epidemic in the north and central parishes the worst since 1910. Several other Southern States also report beetles in epidemic numbers. Pest management specialists of the USDA Forest Service are working with State and federal foresters and private landowners to control the invasion.

State foresters from Louisiana, Mississippi, Texas, Arkansas, and Alabama, along with representatives of industry and the U. S. Forest Service, met at

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**Landowner and Stockman
Gain from Forest Forage**

Remember the stories of feuds between cattlemen and timbermen? Time to put those yarns away with cowboy and Injun lore. Beef producers and tree growers can now live in peace in southern forests and share the land to the advantage of both.

Who says so? USDA Forest Service researchers, who have worked out guidelines on how to do it successfully. Southern Forest Experiment Station research has shown that pines, even in seedling stages, are not seriously damaged when grazing is properly managed.

Some land management practices serve both cattle and timber interests. For instance, controlled burning is useful in manipulating forage for cattle. It also aids in forest regeneration by checking undesirable hardwoods, reducing hazard from wildfire, and preparing seedbeds for pine.

Range research began in the South in 1943, when Southern Station scientists at the Alexandria (Louisiana) Forestry Center evaluated forage found in Coastal Plain pine forests. These early studies revealed that southern forests, especially of longleaf pine, yield worthwhile quantities of forage useful for raising cattle. But phosphorus content of the herbage is insufficient throughout the

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Slash pine seedlings, here in their second winter, are not seriously damaged when grazing is properly managed.





Beneath the bark of a southern pine tree beetles construct S-shaped tunnels where they lay their eggs. Young beetles develop in about a month, chew their way out of the bark and fly to green trees nearby.

Beetles, Cont'd from P. 1

the Southern Forest Experiment Station in February to discuss ways to cope with the problem. A similar meeting was held in Alexandria in March to check on the status of the epidemic.

About 12 million board feet of beetle-killed timber have been salvaged in Louisiana so far—the most effective means known for checking the pests, once an outbreak is well-advanced. Another 10 to 12 million feet need to be cut before early summer, when the beetle population may explode.

William H. Bennett, Southern Station entomologist who heads the insect research at the Station's Alexandria Forestry Center, said that aerial surveys are being made by the U. S. Forest Service and the Louisiana Forestry Commission to determine the extent of the spring invasion. Many infested trees don't fade for months in winter and early spring, Bennett said, and until their changing color shows up by observation or in aerial

photographs, it is difficult to tell how widespread the attack might be. Preliminary ground observations reveal a substantial increase in beetle population throughout the Southeast. Emphasizing the beetle's unpredictability, Bennett said, "We can't tell what course the epidemic will take. The potential is great for it to spread, but it might remain static or even die out."

Asked why Spring '72 is an epidemic year, Bennett at least partly blamed the mild winter. Normally some cold weather in November slows the beetle build-up. But this year there was little or no freezing weather until January, and then only for a day or two at a time. "So instead of the usual seven generations in a year, the beetles continued to mate, breed, and fly continuously through the winter. They ran in several more generations," Bennett said. By the end of November foresters began to be aware of the build-up in beetle population.

Study of the life cycle and

habits of this enemy of southern pines has led Bennett and fellow researchers to some conclusions about its prevention and control. One of them is that "good timber management is good insect management." He explains what this means.

Working in pairs of male and female, the insects (about the size of a grain of rice) attack the bark of living pines. Each pair of beetles makes an S-shaped tunnel under the bark, and the tunnels criss-cross each other, girdling the tree. Eggs are laid in the tunnels and develop into young beetles in about a month. The trees usually produce globs of white resin at the point of beetle entry.

Observation reveals certain trees to be high-risk pines, almost certain to become beetle breeding places. These are trees that have been struck by lightning (sometimes invaded within hours), trees damaged by nearby road construction, utility line clearance, or timber harvest, or trees in a weakened condition from such causes as poor soil drainage, erosion, pathogenic root fungi, drought, or flooding.

Avoiding these conditions by sound land management is referred to by Bennett and other researchers as "silvicultural control of bark beetles"—the best way to minimize chances of attack.

Spelling out their prescription for preventive treatment, they give land managers the following advice:

—Increase the resistance of trees by keeping them growing at a good rate. Slow growth may spell trouble.

—Avoid unnecessary disturbances in your stand of trees. Use

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Foresters urge avoiding careless logging practices which leave crushed roots, skinned trees, deep ruts that cause flooding, and tree tops on the ground to serve as breeding places for bark beetles. Infestations spread from areas like this.

New Chief For Forest Service

Edward P. Cliff, Chief of the USDA Forest Service since 1962, retired April 29, and Associate Chief John R. McGuire is his successor.

During his tenure as Chief, Congress created the National Wilderness Preservation System, which is made up in part of national forest lands. Forest research was greatly expanded, and the multiple use concept of land management was furthered.

Edward P. Cliff



McGuire began his Forest Service career in 1939. After serving in various research positions, he became Director of the Pacific Southwest Forest and Range Experiment Station at Berkeley, California, in 1963. He was appointed Deputy Chief in charge of programs and legislation in Washington, D. C., in 1967 and was promoted to Associate Chief of the Forest Service last year.

John R. McGuire



NEW, FREE, AND READABLE

Need a booklet summarizing the latest knowledge on all major insects that attack living pines in the South?

Then write to the Southern Forest Experiment Station for a copy of "Insect Pests of Southern Pines," by William H. Bennett and H. Eugene Ostmark. It's new, free, and environmentally oriented.

In brief, readable language, the booklet describes the identification and habits of more than a dozen insects or groups of insects. Backing up major points in the text are numerous full-page drawings, all accurate in their entomological details.

The authors have made special efforts to report the latest research on the insects and show how such information permits control by silvicultural methods rather than with chemicals. For example, hazards from pine bark beetles can be lessened by planning timber harvests so as to create minimum disturbance to the remaining forest. Research has also found that the loblolly pine sawfly passes the winter in the egg stage, whereas most other southern sawflies overwinter in cocoons. Winter logging will help suppress the pest, because the eggs are in slits on the needles and the larvae will not survive if the trees are felled.

While the authors have tried to pioneer the subject of silvicultural control, they recognize that pesticides are sometimes necessary when high-value trees are threatened by insect epidemics. In such circumstances, they advise the land manager to consult responsible State or Federal agencies for current pesticide recommendations.

ECONOMISTS OFFER INVESTOR'S GUIDE

One of the best ways to improve supplies of southern timber is to get rid of low-grade hardwoods now occupying much of the land and plant loblolly and slash pine instead. Forest type conversion is the name for it.

The South has 50 million acres in this category—half classified by forest surveys as oak-pine forests, and about half as oak-hickory type. Most of such acreage is owned by farmers.

For several decades forest managers have been able to improve timber supplies by the fairly inexpensive means of planting open areas and practicing timber stand improvement. But these possibilities have been almost exhausted. Now there is a need to restore land by forest type conversion.

Southern Forest Experiment Station economists Walter C. Anderson and Sam Guttenberg have drawn up an investor's guide to help landowners make a decision. A substantial cash outlay is needed to clear away the old material and to plant a new crop. The guide points out several kinds of conversion opportunities open to the landowner, and recommends that he have a forester's appraisal to help select the best course of action in his individual situation.

The expense will vary with such factors as size of the area, number and size of trees growing there, and steepness of slopes. Once the investor has a

Tomorrow's Wildlife

Many species of wildlife, including 58 that are considered rare or endangered, live on or near the national forests and national grasslands. These 187 million acres of public forest also encompass nearly one-fourth of the coldwater fishing streams in the United States, outside of Alaska.

The respective States are responsible for protecting and managing the wildlife, but the Forest Service has the task of maintaining and improving the habitat. Over the years State and federal managers have cooperated to excellent effect. For example, the number of big-game animals on these lands was estimated at 900,000 in 1928. By 1960 the number had leveled off at about 4.5 million.

While there has been substantial growth in numbers of many species, special survival manage-

ment plans are being developed and put into effect on federal and State lands to improve the plight of endangered wildlife species. Some of these are the bald eagle, Tule elk, bighorn sheep, Florida panther, California condor, Kirtland's warbler, and others.

Concern for the habitat of all the animals and birds that make their homes on the national forests and grasslands, and plans to assure survival of rare and endangered species, are described in a new USDA Forest Service booklet. Titled "Wildlife for Tomorrow," the 28-page publication contains color photographs and text about the prospects of this country's wildlife, one of the forest's renewable resources.

Copies are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

**The quality and quantity of habitat is the key
to population levels of most game species.**



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TEACHERS TAKE NOTE!

A lot of help is available for educators and group leaders wanting to plan environmental studies. But knowing where to find it is sometimes difficult.

To make the finding easier, the USDA Forest Service has issued a small booklet suggesting local, State, and federal sources of material and a bibliography with basic texts listed according to grade level. The book lists were compiled by the Conservation Education Association. Hints in getting program assistance are included.

Copies of "Help for Environmental Programs" are available from the Southern Forest Experiment Station.

Guide, Cont'd from P. 4

forester's appraisal of the physical facts of his site, he must select the species of pine to plant, choose a rotation age, and decide the minimum rate of return he will accept for his capital.

With this information, he can turn to the Anderson-Guttenberg charts and find about what he can afford to invest per acre in converting his land. Or, if he knows how much he is willing to invest per acre, he can read the chart to find about what return he can expect.

Copies of the "Investor's Guide to Converting Southern Oak-Pine Types" may be obtained from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

Old Seeds for Old Custom

The first Arbor Day was celebrated in Nebraska on April 10, 1872. The idea, conceived by J. Sterling Morton, a member of the State Board of Agriculture, soon became nationwide.

To mark the 100th anniversary of a holiday of special significance to the USDA Forest Service, Southern Forest Experiment Station researcher James P. Barnett is planting some unique seedlings on the grounds of the Forestry Center in Alexandria, Louisiana. They are slash and loblolly pine trees from 40-year-old seeds—probably the world's oldest living pine seeds.

Philip C. Wakeley, who recently retired from the Forest Service, gathered the seeds in 1931 and stored them at temperatures just above freezing. Germination held up well for three decades, but now is down to 70 percent for the slash pine seeds and 23 percent for the shortleaf.

In southern pines, good seed

crops are usually a few years apart. The original purpose of the test was simply to learn whether foresters could store a supply for use in times of scarcity. Very long storage is probably of interest chiefly to geneticists, who may wish to keep seed for reference purposes.

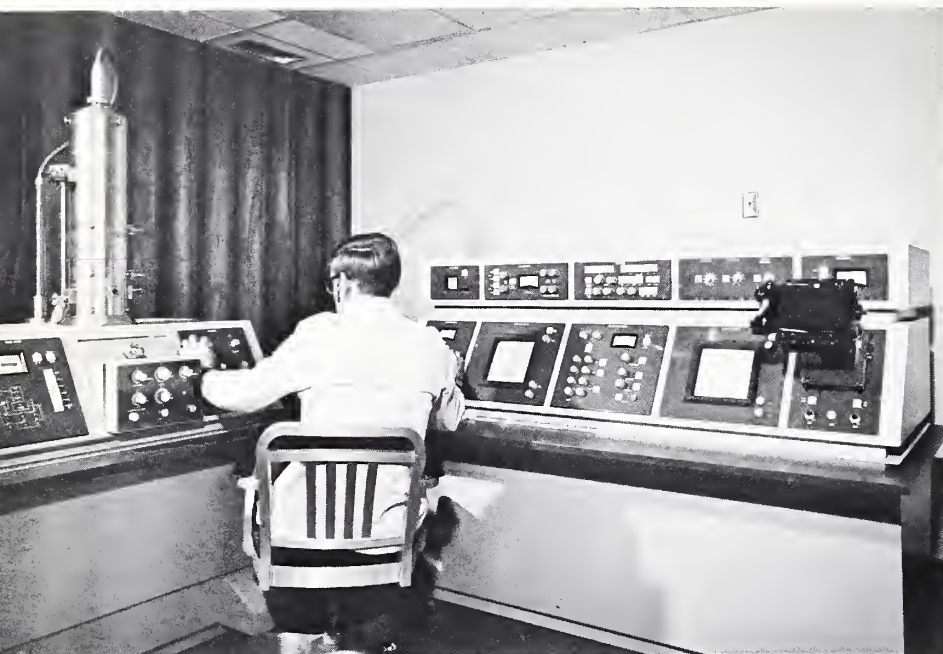
Seeds of some broadleaved trees, such as locust, acacia, and albizzia, have survived for 100 years. Could pine seeds be kept that long? Barnett thinks there's a bare chance, since knowledge of their physiology has improved considerably. He hopes that some of the present lot will make it to 50 years.

Meanwhile, how do the newly germinated trees look? Just like any other pines. And they're shooting up thriftily. When the centennial of Arbor Day is past they will be growing on the grounds of the Alexandria Forestry Center in green tribute to Americans who cared for the environment and did something about it.

These pine seedlings, newly germinated from seed stored for 40 years, will be planted in commemoration of the 100th Arbor Day. The one at left has not yet shed its seedcoat.



Scanning Electron Microscope Makes New Research Possible



By providing magnification up to 50,000 $\times$ with very great depth of focus, the scanning electron microscope recently installed at the Alexandria Forestry Center permits research heretofore impossible. Among other things, it will be used to learn more about changing the characteristics of fibers during processing. With such knowledge, it may be possible to improve methods for mechanically pulping southern pine and perhaps to develop entirely new uses for low-grade hardwoods growing on pine sites. Quite possibly hardwoods could be used in their entirety—leaves, bark, branches and stem.

Sycamore Silage

Forest scientists have been working hard to develop a system for growing sycamore pulpwood in dense plantations and harvesting it in much the same way that farmers harvest silage. Wood processors may soon find the system profitable, according to an economic analysis recently completed by the Southern Forest Experiment Station.

If the concept is adopted, tree farms in the United States will look more like ordinary farms than they ever have before. The

system calls for sycamore trees no more than 4 years old and less than 6 feet apart to be severed, chipped, blown into trucks, and hauled to mills with little or no hand labor. Sycamore is an ideal species because it grows rapidly when young and its stumps sprout readily. The last attribute makes up to four harvests possible before replanting is required.

In his Research Paper, "Economic Implications of Silage Sycamore," George F. Dutrow describes in detail the conditions under which the system would



This is how the scanning electron microscope sees a loblolly pine tracheid unwinding in the manufacture of groundwood pulp. Learning how to control the unwinding process may make possible stronger, better pulps.

be profitable. Industries that are currently buying hardwood chips could make a profit growing sycamore silage in some circumstances. The processor would have to buy substantial amounts of heavy equipment, and he would have to allocate 4,000 to 8,000 prime acres to the project. Growing of silage sycamore is no operation for the small landowner or for one who is uncertain of the price his chips might bring. But for some industrial landowners the profits could be considerable.

Copies of the report, USDA Forest Service Research Paper SO-66, are available on request from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

CALLING ALL WOMEN!

Sensitive to the beauty of earth and the importance of safeguarding it for future generations, women of America are asking, "How can we support conservation efforts?"

To suggest answers to this question, the Southern Region of the USDA Forest Service has published a pocket-size booklet titled "Women—Your Environmental Challenge."

The full-color, 28-page booklet deals with all aspects of the forest resource. For example, one concern of the Forest Service is to manage watersheds to assure clean water for beauty, recreation, communities, and industries. As a citizen concerned about water quality, a woman might ask, "Do I know the water pollution laws of my State?" Or, "Should I take part in public hearings on water pollution problems?"

What can a citizen concerned with environment do to understand the Nation's need for wood products and the ways forests are managed to meet those needs?

How can one support wilderness and scenic areas? What can be done to stimulate an awareness of the dangers of wildfires? (Nineteen out of 20 forest fires are man-caused.) Outdoor recreation is recognized as a pathway to physical and mental well-being. How can more people be helped to enjoy it without defacing or abusing nature's beauty?

Copies of the booklet are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.



Outdoor recreation is recognized as a pathway to physical and mental health.

MULCHING WITH BARK

The Northeastern Forest Experiment Station has published a leaflet on "Bark Mulch—Natural Artistry Around Your House." Printed in full color, the booklet describes uses of bark mulch for homeowners and how such use helps solve the dilemma of bark accumulating at sawmills. Copies are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

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Seventy percent of the South's 198 million acres of forest land is owned by 6 million nonindustrial owners—mostly in small private tracts.

Forage, Cont'd from P. 1

year, and there isn't enough protein during winter. Special programs of supplemental feeding to remedy these diet shortages were tested during the 1940's and 50's.

10-Year Study Started

With this experience behind them, researchers V. L. Duvall, L. B. Whitaker, and H. A. Pearson began a big study in 1960 on 1,600 acres of the Palustris Experimental Forest. The long-leaf pine trees there had been cut more than 25 years before the study began, and only scattered pines and oaks remained. Slender bluestem and pinehill bluestem were the dominant grasses.

One-quarter of each range unit was prescribe-burned annually for the first 4 years. The object was both to improve forage quality and to reduce rough. The burned areas were planted or seeded to slash pine the winter after the fire.

New pines were protected from fire until they were 5 or 6 years old. After that, prescribed burning was on a 3-year rotation. Grazing was heaviest on newly burned areas, because fires remove dead plant material and stimulate new growth high in protein.

Three stocking rates were established—26, 20, and 13 acres per animal—calculated to attain light, moderate, and heavy grazing.

Herd Managed

Cattle were furnished protein and mineral supplements to correct nutritional imbalances in the range forage. From November through May each cow

received about 400 pounds of cottonseed cake. Salt and steamed bonemeal were provided throughout the year, and grass hay fed during extended periods of bad weather.

Most cows were Brahman crossbreeds. Bulls were high-quality Shorthorns or Herefords. The breeding season was limited so that calves were born during late winter, in time for August marketing.

Records were kept of direct expenses for grazing, designated as investment and operational costs. Investments include fences, water supplies, corrals, animals, equipment, and supplies. Operational costs include such items as feed, rotation burning, and care of bulls.

Leases Benefit Both

On the grazing investment, net returns per acre of range (not including labor) were \$1.88, \$1.82, and \$2.67 for light, medium, and heavy grazing. These returns are, in effect, the value of the forage.

As for how the trees fared, grazing made little difference in growth of seeded or planted pines to age 5. Neither light nor moderate grazing affected pine survival. Heavy grazing did not significantly reduce survival of seeded pines. On planted areas it resulted in 124 fewer trees per acre at age 5, but these losses were fairly well distributed throughout the stands.

Value of forage will vary depending on density and size of trees, and grazing leases can be adjusted accordingly. There is a trend in some parts of the South for land managers and cattlemen to get together on leasing grazing rights. For the cattleman, the lease provides an

assured supply of forage for his herd. For the landowner, the lease provides some income while his pines grow to merchantable size. While leases are a matter of negotiation in the light of local conditions, the Alexandria researchers feel a fee equal to 10 percent of net returns per acre may be reasonable when herd and range are carefully managed.

To learn more about details of how Southern Station researchers successfully produced pine trees and cattle together, write to Station headquarters, T-10210 Federal Building, 701 Loyola Avenue, New Orleans, Louisiana 70113.

Beetles, Cont'd from P. 2

mechanized equipment with care. Schedule timber cutting to discourage beetle buildups, and use good judgment in planning and developing road systems, rights-of-way, artificial lakes, and recreational areas.

—Utilize lightning-struck trees, where practical, as traps, and dispose of them before beetles emerge. In the same manner, quickly salvage trees damaged by fire and windstorm. They too are focal points of infestation.

—Provide good surface drainage by adequate ditches and well-planned culvert systems.

The researchers believe it is entirely possible that, with truly intensive forest management, bark-beetle outbreaks can be prevented. They point to experience in the forests of Germany, Scandinavia, and other European countries, where similar beetles once caused problems akin to those in the South but are practically unknown now.